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BUREAU OF AGRICULTURAL ECONOMICS

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REVISED TENTATIVE UNITED STATES STANDARDS FOR QUALITY OF CREAMERY BUTTER

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REVISED TENTATIVE UNITED STATES STANDARDS FOR QUALITY OF CREAMERY BUTTER[1]

By virtue of the authority vested in the Chief of the Bureau of Agricultural Economics by the Secretary of Agriculture as set forth in paragraph 2 of section 1 of regulation 5 of Service and Regulatory Announcements No. 137, of the United States Department of Agriculture, the Revised Tentative United States Standards for Quality of Creamery Butter herein set forth are approved as the tentative standards that shall be employed for the grading and certification of creamery butter by official graders of the United States Department of Agriculture on the first day of April 1938 and thereafter, unless and until amended or superseded by other standards.

A. G. BLACK,
Chief of Bureau.

TENTATIVE UNITED STATES STANDARDS FOR QUALITY OF CREAMERY BUTTER

DEFINITIONS

For the purpose of the revised tentative United States standards[2] for quality of creamery butter:

Butter.—Butter shall be the food product usually known as butter, and which is made exclusively from milk or cream, or both, with or without common salt, and with or without additional coloring matter, and containing not less than 80 percent by weight of milk fat, all tolerances having been allowed for.[3]

Creamery butter.—Creamery butter shall be butter manufactured in a commercial creamery.

United States score grade.—The United States score grade of a lot of creamery butter consisting of packages of the same official United States score shall

[1] Tentatively supersedes Service and Regulatory Announcements (Markets) 51.

[2] The specifications of these standards shall not excuse failure to comply with the provisions of the United States Food and Drugs Act.

[3] In conformity with act of Congress approved March 4, 1923.

be expressed in terms of an official United States score using whole numbers only. The United States score grades shall be from U. S. 85 score to U. S. 93 score, inclusive. In the United States score grades no tolerance is permitted for butter that is below the official score designated by the United States score grade of the lot.

Mixed lot.—Any lot of butter that fails to meet the requirements of a particular United States score grade shall be classified as a "mixed lot." The quality of the butter comprising a mixed lot shall be expressed in terms of the range of official United States scores of the samples drawn from the lot for grading, as U. S. 90–91 score; U. S. 89–91 score, and U. S. 92–93 score.

UNITED STATES GRADES FOR CREAMERY BUTTER ESTABLISHED

The following United States grades for creamery butter are established:

U. S. 93 score butter shall possess a fine flavor. It may possess a very slight normal feed, slightly cooked, slightly grassy, or slightly alfalfa flavor. It is made from cream to which a culture (starter) may or may not have been added. The defects in body, color, or salt are limited to a rating of one-half in any one factor.

U. S. 92 score butter shall possess a pleasing flavor. It may possess a definitely cooked, definitely alfalfa, definitely grassy, slightly normal feed, slightly storage, slightly heated cream (summer defect), slightly flat, or a slightly coarse flavor. The defects in body, color, and salt are limited to a rating of one-half in any one factor unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed one-half (table 1, p. 10).

U. S. 91 score butter shall possess a fairly pleasing flavor. It may possess any of the following flavors if present only to a slight degree: Acidy, burnt-malty, utensil, scorched, neutralizer, greasy, woody, bitter, and old-cream. It may possess any of the following flavors even when present to a definite degree: Storage, normal feed, new rank grass, heated cream (summer defect), flat, coarse, and smothered. The defects in body, color, and salt are limited to a rating of one-half in any one factor unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed one-half (table 1).

U. S. 90 score butter shall possess a fairly pleasing flavor. It may possess any of the following flavors if

present only to a slight degree: Fruity, cabbage, turnip, potato, rape, weedy, musty, and barny. It may possess any of the following flavors even when present to a definite degree: Acidy, burnt-malty, utensil, scorched, neutralizer, greasy, woody, bitter, and old-cream. A pronouncedly silage or heated cream (summer defect) flavor is permitted in butter of this score. The defects in body, color, and salt are limited to a rating of one-half in any one factor unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed one-half (table 1).

U. S. 89 score butter may possess a yeasty, cheesy, metallic, or oily flavor if developed only to a slight degree. It may possess any of the following flavors even when present to a definite degree: Sour, fruity, neutralizer-scorched, alkaline, cabbage, turnip, potato, rape, weedy, musty, stale-cream, and barny. It may possess either of the following flavors when present to a pronounced degree: Burnt-malty and utensil. The total ratings for defects in body, color, and salt are limited to a maximum of one unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed one (table 1).

U. S. 88 score butter may possess a slightly obnoxious weed flavor or any of the following flavors even when present to a definite degree: Yeasty, cheesy, oily, metallic, cabbage, turnip, potato, and rape. It may possess any of the following flavors when present to a definite degree and when associated with aged or old cream: Fruity, musty, and barny. It may possess any of the following flavors even when present to a pronounced degree: Sour, alkaline, and stale-cream. The total ratings for defects in body, color, and salt are limited to a maximum of one unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed one (table 1).

U. S. 87 score butter may possess any of the following flavors—fishy, onion, and garlic—when present only to a slight degree; obnoxious weed flavor when developed to a definite degree or an oily, yeasty, cheesy flavor when present to a pronounced degree. It may also possess the following flavors even when present to a pronounced degree and associated with aged or old cream: Fruity, musty, and barny. The total ratings for defects in body, color, and salt, are limited to a maximum of two unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed two (table 1).

U. S. 86 score butter may possess any of the following flavors: Definitely fishy, definitely onion or garlic, and pronouncedly obnoxious weed. The total ratings for defects in body, color, and salt are limited to a maximum of three unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed three (table 1).

U. S. 85 score butter may possess a pronouncedly onion or garlic flavor. The total ratings for defects in body, color, and salt are limited to a maximum of four unless the flavor rating is sufficiently high to permit the total ratings for defects in these factors to exceed four (table 1).

No grade.—Butter that is below the requirements of U. S. 85 score because of its flavor or other condition, or because of excessive defects in body, color, and/or salt shall be classified as "no grade".[4]

BASIS FOR DETERMINATION OF QUALITY OF CREAMERY BUTTER

The basis for determination of quality of creamery butter, except "no grade" butter, shall be the ratings given the flavor and the defects in body, color, and salt. The official United States score of individual samples of creamery butter shall be determined by the following general rule: The official United States score of an individual sample of creamery butter shall be determined by deducting from the flavor rating[5] of the sample the amount that the total ratings of the defects in body, color, and salt is in excess of the ratings for defects permitted in these factors for butter of the particular flavor rating (table 1, p. 10), the official United States score to be expressed as a whole number by lowering any half score to the next lower full score.

[4] See pp. 8 and 9 for flavors and conditions that cause butter to be classified as "no grade."

[5] When more than one flavor is discernible in a sample of butter, surface flavors excepted, the flavor rating for the sample shall be established on the basis of the flavor that carries the lowest rating.

RATINGS OF CERTAIN IDENTIFIED FLAVORS IN CREAMERY BUTTER

The various identified flavors in butter listed below shall be rated as follows:

Identified flavor	*Rating*
Fine	93
Pleasing	92
Fairly pleasing	91–90
Acidy:	
Slightly acidy	91
Definitely acidy	90
Sour:	
Definitely sour	89
Pronouncedly sour	88
Burnt-malty:	
Slightly burnt-malty	91
Definitely burnt-malty	90
Pronouncedly burnt-malty	89
Utensil:	
Slightly utensil	91
Definitely utensil	90
Pronouncedly utensil	89
Fruity:	
Slightly fruity (throughout mass)	90
Definitely fruity (throughout mass)	89
Definitely fruity (aged or old cream)	88
Pronouncedly fruity (aged or old cream)	87
Yeasty:	
Slightly yeasty	89
Definitely yeasty	88
Pronouncedly yeasty	87
Cheesy:	
Slightly cheesy	89
Definitely cheesy	88
Pronouncedly cheesy	87
Cooked:	
Slightly cooked	93
Definitely cooked	92
Scorched:	
Slightly scorched	91
Definitely scorched	90
Neutralizer:	
Slightly neutralizer	91
Definitely neutralizer	90
Definitely neutralizer—definitely scorched	89

Identified flavor	*Rating*
Alkaline:	
Definitely alkaline	89
Pronouncedly alkaline	88
Storage:	
Slightly storage	92
Definitely storage	91
Greasy:	
Slightly greasy	91
Definitely greasy	90
Oily:	
Slightly oily	89
Definitely oily	88
Pronouncedly oily	87
Metallic:	
Slightly metallic	89
Definitely metallic	88
Fishy:	
Slightly fishy	87
Definitely fishy	86
Feed:	
Very slightly normal feed	93
Slightly normal feed	92
Definitely normal feed	91
Silage:	
Pronouncedly silage	90
Alfalfa:	
Slightly alfalfa	93
Definitely alfalfa	92
Grassy:	
Slightly grassy	93
Definitely grassy	92
Definitely new rank grass	91
Cabbage, turnip, potato, rape:	
Slightly cabbage, turnip, potato, and rape	90
Definitely cabbage, turnip, potato, and rape	89–88
Weedy:	
Slightly weedy	90
Definitely weedy	89
Obnoxious weeds:	
Slightly obnoxious weeds	88
Definitely obnoxious weeds	87
Pronouncedly obnoxious weeds	86

Identified flavor	*Rating*
Onion or garlic:	
Slightly onion or garlic	87
Definitely onion or garlic	86
Pronouncedly onion or garlic	85
Musty:	
Slightly musty	90
Definitely musty	89
Definitely musty (aged or old cream)	88
Pronouncedly musty (aged or old cream)	87
Woody:	
Slightly woody	91
Definitely woody	90
Heated cream (summer defect):	
Slightly heated cream	92
Definitely heated cream	91
Pronouncedly heated cream	90
Flat:	
Slightly flat	92
Definitely flat	91
Coarse:	
Slightly coarse	92
Definitely coarse	91
Smothered:	
Definitely smothered	91
Bitter:	
Slightly bitter	91
Definitely bitter	90
Old-cream:	
Slightly old-cream	91
Definitely old-cream	90
Stale-cream:	
Definitely stale-cream	89
Pronouncedly stale-cream	88
Barny:	
Slightly barny	90
Definitely barny	89
Definitely barny (aged or old-cream)	88
Pronouncedly barny (aged or old-cream)	87

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GRADING OF BUTTER THAT SHOWS ABNORMAL SURFACE CONDITION OR FLAVOR

Butter that shows abnormal surface condition or flavor shall be graded in accordance with the following rules:

Rule 1.—Butter that shows very slight development of mold on the surface or on the packing materials which are in contact with the butter shall be graded without respect to the presence of mold, except that its presence and extent of development shall be stated on the grading certificate, with the United States score of the butter followed by the words, "off-surface condition." However, when mold has developed to any considerable extent on the surface of the butter or on the packing materials that are in contact with the butter, or has penetrated the butter to any appreciable extent so that it cannot be removed by scraping a thin layer of the butter, such butter shall be classified as "no grade." When there is any development of mold on the surface of print butter or on the packing materials which contact the butter, such butter shall be classified as "no grade."

Rule 2.—When the following flavors—fruity, storage, woody, tallowy, rancid, paint, varnish, chemical, gasoline, kerosene, fly spray, and disinfectant—are present only on the surface of butter and may have penetrated to a depth of not more than one-fourth inch in bulk butter or one-sixteenth inch in print butter, such butter shall be rated for flavor solely on the basis of the flavor of the interior portion of the butter. However, the character, degree, and extent of the flavor on the surface of the butter should be fully described on the grading certificate and the United States score of the butter followed by the words "off surface condition."

When fruity, storage, and woody flavors have penetrated or are present in bulk butter beyond a depth of one-fourth inch, or in print butter beyond a depth of one-sixteenth inch, the butter shall be rated for flavor on the basis of such flavors being present throughout the mass of butter.

Rule 3.—When the flavors listed in rule 2 (except fruity, storage, and woody) have penetrated the surface in bulk butter beyond a depth of more than one-fourth inch and in print butter to a depth greater than one-sixteenth inch, such butter shall be classified as "no grade."

OTHER FLAVORS AND CONDITIONS IN BUTTER THAT CAUSE IT TO BE CLASSIFIED AS "NO GRADE"

Butter that possesses the following flavors or in which the following conditions are present shall be classified as "no grade."

1. Flavors:

Pronouncedly fishy.	Rancid (interior).
Surface-taint.	Paint or varnish (interior).
Limburger.	Chemical (interior).
Tallowy (interior).	Gasoline, kerosene, or fly spray (interior).

2. Conditions:

Grains of sand.
Splinters of wood.
Specks of rust.

RATINGS FOR DEFECTS IN BODY, COLOR, AND SALT

The ratings for defects [6] in body, color, and salt shall be established in accordance with the following rules:

Rule 1.—Mealy, gummy, leaky, salvy, greasy, spongy or weak, crumbly, sticky or pasty body, wavy color, color specks, and sharp salt shall be rated for defects as follows:

Defects	*Rating*
Slight	½
Definite	1
Pronounced	2

Rule 2.—Leaky-sticky, leaky-briny, leaky-cloudy, and leaky-briny-cloudy body shall be rated for defects as follows:

Slight	1
Definite	2
Pronounced	3

Rule 3.—Ragged-boring body shall be rated for defects as follows:

Definite	3
Pronounced	4
Extreme	5

Rule 4.—Streaked or mottled color shall be rated for defects as follows:

Slight	2
Definite	3
Pronounced	4
Extreme	5

[6] See table 2 on p. 29, for classification of the ratings of each degree of defect in body, color, and salt.

Rule 5.—High color shall be rated for defects as follows:

Defects	*Rating*
Definite	1
Pronounced	2
Extreme	3

Rule 6.—Gritty salt shall be rated for defects as follows:

Slight	1
Definite	2
Pronounced	3
Extreme	4

DEFECTS PERMITTED IN BODY, COLOR, AND SALT WITHOUT CAUSING OFFICIAL UNITED STATES SCORE TO BE PLACED BELOW FLAVOR RATING

The maximum total ratings for defects in body, color, and salt permitted in butter that do not cause the official United States score of butter to be lowered below the flavor rating are indicated in table 1.

TABLE 1.—*Defects permitted in body, color, and/or salt without causing the official United States score to be placed below the flavor rating*

Flavor rating	Maximum total ratings for defects permitted in body, color, and/or salt	Limitations of defects to 1 or more factors
93	½	In 1 factor only.
92	½	Do.
91	½	Do.
90	½	Do.
89	1	
88	1	
87	2	
86	3	
85	4	

When the sum of the ratings for the defects in body, color, and salt exceeds that permitted by table 1 for butter of a specified flavor rating, the butter shall be given an official United States score below the flavor rating in accordance with the general rule (p. 4) for determining the official United States score of individual samples of creamery butter. (See p. 30 for "explanation of application of table 1 and the general rule.")

EXPLANATION OF REVISED TENTATIVE UNITED STATES STANDARDS FOR QUALITY OF CREAMERY BUTTER

By Roy C. Potts, *principal marketing specialist;* Edward Small, *marketing specialist;* and C. W. Fryhofer, *senior marketing specialist*

The Revised Tentative United States Standards for Quality of Creamery Butter (effective April 1, 1938) provide a more direct, definite, and accurate basis for grading creamery butter than was contained in Service and Regulatory Announcements No. 51, which since 1919 has been used by the Bureau of Agricultural Economics in its butter-grading service.[7] The revised tentative standards represent a refinement and improvement of the previous standards and provide a more exact and simplified system of determining the official United States score. The correct application of these standards will require expert knowledge of the various quality characters that may be present in butter, ability on the part of graders to recognize and identify these characters, and a high degree of skill in determining the degree of their development. The use of these tentative standards should result in a more unified, accurate, and useful grading service.

NEW FEATURES EMBODIED IN REVISED STANDARDS

An important new feature in the revised standards is a narrowing of the range of score for butter from the old basis of 75 to 95 points to a new basis of 85 to 93 points. Only 9 points in a score range (85–93) are practicable for use in grading butter. This new feature requires the elimination of the lower 10 points (75–84) and the upper 2 points in the previous range of the numerical score for butter.

A second feature is the discontinuance of the package as a factor in determining the quality of butter. The package is not a constituent part of the product and has no definite or direct influence on its quality. It would be impossible to establish uniform standards for packages that would be practicable for all channels of trade, for the present accepted commercial practices differ widely within the various channels and in different markets.

[7] Service and Regulatory Announcements (Markets) No. 51. The Inspection of Butter Under the Food Products Inspection Law. Washington, D. C., May 28, 1919. (Out of print.)

Another feature is the discontinuance of the score-card method of prorating the score to various factors and the substitution of a simple, definite, and more direct method of rating each factor. In the revised tentative standards, flavor and the defects in body, color, and salt are rated independently, according to the standards established for them. The standards for flavor provide ratings for the different flavors and the degrees of their development. The defects in body, color, and salt are similarly rated. The official United States score of a churning or sample of butter is determined by application of a general rule after the factor of flavor and the defects in body, color, and salt have been rated.

THE FACTOR OF FLAVOR

The flavor of butter is determined primarily by the senses of taste and smell. Certain taste sensations, notably greasy and oily, are detected by the sense of touch. To register its full taste sensation a substance must be soluble so that it can be carried quickly to the taste buds on the tongue. There are only four primary taste sensations—sweet, sour, salt, and bitter. Sugar produces the sensation of sweetness; lactic acid or a tart apple produces a sour taste; common table salt, a sensation of saltiness; and quinine produces a bitter sensation.

The sense of smell supplements taste in determining flavor in butter. The warmth of the mouth melts the butter and frees its volatile aromas which enter the olfactory chambers and come forward into the nose. Moisture in the mouth and nasal passages assists the development and transmission of flavor sensations. When melted butter comes in direct contact with the taste buds, its sweet and salty characteristics are detected by those located at the tip of the tongue, its sour characteristics by those on the sides of the tongue, and its bitter characteristics by those at the back of the tongue.

The proper procedure in grading butter is first to use the sense of smell and then the sense of taste to establish the character, probable origin, and degree of development of each flavor present. By discerning carefully the odor or aroma characteristics of the sample and the character and degree of the flavor present, the grader is able to identify and classify the flavor properly.

Aroma in butter may be present to a greater or lesser degree. In the higher grades of butter, a pleasing

aroma accentuates or makes more pronounced certain pleasing or desirable flavors. An objectionable aroma or odor is generally associated with flavors present in the lower grades of butter and serves to accentuate and make more pronounced the objectionable flavor characteristics of those grades. The aroma noted in butter before it is tasted is a general indication of its quality.

CLASSIFICATION OF FLAVORS ACCORDING TO ORIGIN

Flavors in butter may be classified into six groups according to character and origin as follows: (1) Flavors from action of micro-organisms, (2) flavors from mechanical causes, (3) flavors from chemicals and chemical changes, (4) flavors caused by feed conditions, (5) absorbed flavors, and (6) flavors of obscure origin.

FLAVORS FROM ACTION OF MICRO-ORGANISMS

The flavor characteristics that result from action of micro-organisms in cream and butter vary greatly, depending upon the kind of organisms present, the conditions under which their development takes place, and the extent or degree of their development.

Acid-producing bacteria, under certain conditions, may produce an excessive acidity in the cream which, when present in butter, gives it an "acidy" flavor. An acidy flavor may be present in butter made from milk or cream that was mostly sweet but to which acidy or slightly acidy milk or cream was added. It may also be caused by the improper use of starter or culture. An acidy flavor, when developed to only a slight degree, imparting a slight harshness, limits the flavor rating to 91. This flavor should not be confused with that produced by a desirable flavored starter or culture.

A "sour" flavor in butter may be caused by an overripened starter, very high-acid cream, or the retention of considerable quantities of buttermilk in the butter. This flavor, when present to a definite degree, limits the flavor rating to a maximum of 89.

A "burnt-malty" flavor is indicated by its name. It is generally caused by the growth of a certain organism (*Streptococcus lactic var. maltigenes*) in cream that may be of low acidity. This flavor occurs most frequently during the summer but may be found in butter during the other seasons. It is often traceable to insufficiently washed or sterilized cream cans and separators in which

this organism has developed. When the flavor is present to a slight degree, it limits the flavor rating to a maximum of 91.

The flavor termed "utensil" is characterized by a more or less "off" taste and aroma, indicating a possible lack of proper washing and sterilization of the utensils and equipment used on the farm or in the creamery. Pitted and rusty cream cans may be responsible for this flavor. The maximum rating of a slightly utensil flavor is 91.

A sweetish flavor resembling the aroma or flavor of fruit is characterized as "fruity." Fruity flavors may occur in butter that has been held in cold storage for several months or longer. When the flavor is present to a slight degree the flavor rating is limited to a maximum of 90. This flavor, when present in butter made from aged or old cream, limits the flavor rating to 88.

A yeasty flavor in butter, due to a yeasty fermentation, is described as "yeasty." Yeasts may cause a sweetish taste in cream through the fermentation of the milk sugar as the result of enzymic action. Old yeasty cream generally imparts a bitter flavor to the cream which is carried over into the butter. This flavor, when present to a slight degree, limits the flavor rating to a maximum of 89.

A flavor that resembles the taste of cheese of the American Cheddar type is described as "cheesy". It is primarily a hot-weather defect occurring in sour, curdy cream. Excessive quantities of buttermilk in the butter, overripe and curdy starter, and excessive ripening of the cream—each or in combination—also may cause cheesy flavor. A cheesy flavor when present to a slight degree limits the flavor rating to a maximum of 89.

FLAVORS FROM MECHANICAL CAUSES

Flavors imparted to butter as a result of excessive heating of the cream during the pasteurization process are classified as of mechanical cause.

In the pasteurization of cream for buttermaking, the temperature attained under certain conditions may produce a "cooked" flavor that is sometimes called a custard flavor. This flavor has a nutty character and is not considered objectionable for it usually disappears entirely after the butter is chilled for a few days. A cooked flavor is smooth to the taste and does not impart a harsh, bitter aftertaste as does a "scorched"

flavor. When a slightly cooked flavor is present in butter that otherwise has a fine flavor, a rating of 93 is given.

A flavor produced under similar conditions but of a more intensified character is termed "scorched." A scorched flavor may be produced readily by filling the vat above the coil so that proper agitation of the cream is not obtained in pasteurization. When a small volume of cream is pasteurized in a vat pasteurizer with a considerable part of the coil above the cream, the cream will tend to adhere to the hot coil, resulting in a high temperature of the adhering film of cream. The excessive heating of this cream imparts a scorched flavor to the entire vat of cream. A scorched flavor may also be caused by too high a temperature of the water passing through the coils in relation to the temperature of the cream. Oxidized flavors of milk and cream, which are caused largely by the catalytic action of copper, are known to be associated with a scorched flavor. A scorched flavor imparts a bitter taste. When this flavor is present to a slight degree, it limits the flavor rating to 91.

FLAVORS FROM CHEMICALS AND CHEMICAL CHANGES

Certain flavors in butter may have their origin in neutralizers that are added to the cream during the process of manufacture. Other flavors may result from chemical changes that take place in the butter.

The addition of an alkali or combination of alkalies to cream, to reduce the acidity of the cream before pasteurization, is generally known as neutralization. This term is a misnomer; the process should be termed "standardization of acidity" since complete neutralization is not attempted in practical creamery operations. Weak alkalies like sodium bicarbonate produce a sweetish taste, whereas strong alkalies like lime produce a bitter taste. A "neutralizer" flavor when slightly perceptible limits the flavor rating to a maximum of 91. A "scorched neutralizer" flavor is somewhat more objectionable. It is usually found in butter made from improperly neutralized sour cream. When this flavor is definite in character it is rated 89. When lime flavors are present to a pronounced degree they are characterized as "overneutralized" or "alkaline" and the flavor rating is limited to a maximum of 89.

After butter is held in cold storage for a period of time, usually several months or longer, it may develop

more or less of a characteristic "storage" flavor as a result of certain chemical changes. A slight storage flavor in butter that otherwise has a pleasing flavor limits the flavor rating to a maximum of 92.

A "greasy" flavor is usually caused by rapid heating of cream of very high fat content, especially when a small volume of cream is pasteurized. It may also be caused by churning cream that has not been held long enough after pasteurization to produce well-chilled fat globules. In washing and working such granules there is a tendency to produce a finished product that possesses a greasy flavor. Cream held too long at too high temperature before pasteurization or cooled too slowly after pasteurization may also produce a greasy flavor. When present to a slight degree this flavor limits the flavor rating to a maximum of 91.

An "oily" flavor is usually the result of oxidation. The equipment used in the handling and treatment of the cream before churning may provide a medium for chemical change. The presence of copper hastens the formation of an oily flavor. Butter of acid character is less likely to become oily as acidity lessens oxidation. The pasteurization of improperly neutralized cream or of sour cream at high temperatures and the exposure of such cream to air and light, may cause an oily flavor. Slow cooling of the cream after pasteurization may also cause an oily flavor. When present to a slight degree, an oily flavor limits the flavor rating to a maximum of 89.

"Metallic" flavor in butter may have its origin in chemical changes in the milk, cream, or butter, or it may result from contact of milk or cream with some metallic surfaces. This flavor generally is caused by keeping cream on the farm in poorly tinned containers; by keeping cream, especially if sour, in old rusty cans in the creamery before emptying it into the cream vats and by holding cream, especially sour cream, in poorly tinned vats. Contact of cream with corroded iron or copper pipes may cause the cream to develop a metallic flavor. This flavor when present to a slight degree limits the flavor rating to a maximum of 89.

A flavor that resembles the flavor of mackerel or herring is termed "fishy." It is caused by a chemical decomposition of lecithin which is an unstable nitrogenous substance in butter. When present to a slight degree this flavor limits the flavor rating to a maximum of 87.

FLAVORS CAUSED BY FEED CONDITIONS

Feed flavors in butter are due to feed flavors that are present in the milk or cream.

Most dry feeds, like hay and many of the concentrates, even when fed in large quantities, normally do not have more than a very slight objectionable effect on the flavor of the milk. Some feed flavors are driven off during the process of pasteurization. When dry-feed flavors are present to a very slight degree and the butter otherwise has a fine flavor, a rating of 93 is given. Silage flavors may vary in degree and character depending upon the time of feeding and the extent of fermentation and the kind of silage. When not present to a pronounced degree they are rated as normal feed flavors. When present to a pronounced degree they limit the flavor rating to 90.

Green alfalfa produces a mild sweet flavor which is characteristic of much of the butter produced in the irrigated valleys of the Rocky Mountain and Pacific Coast States, where it is fed extensively to milk cows. When present to a slight degree and the butter otherwise has a fine flavor, a rating of 93 is given.

Butter produced in the spring and early summer when cattle are turned on fresh natural grass possesses a grass flavor. Natural grass imparts a pleasing high aroma which is desirable in high-scoring butter. When the natural-grass flavor is present to a slight degree and the butter otherwise has a fine flavor, a rating of 93 is given. Rank growthy grass often produces a definitely bitter flavor. Its maximum flavor rating is 91.

Cabbage, turnip, potato, and rape produce feed flavors in butter, the characters of which are indicated by their names. When present to a slight degree, these flavors are limited to a maximum flavor rating of 90.

"Weedy" flavors in butter are the result of weedy-flavored cream. When present to a slight degree, weedy flavor in butter limits the flavor rating to a maximum of 90. Flavors in butter due to French weed and peppergrass are classed as "obnoxious weedy" flavors for they impart an undesirable flavor to the butter. When an obnoxious weedy flavor is present to a slight degree, the flavor rating is limited to a maximum of 88.

"Onion" and "garlic" flavors are very objectionable feed flavors. They are recognized by their peculiar

taste suggestive of their names. When present to a slight degree, they limit the flavor rating to a maximum of 87.

ABSORBED FLAVORS AND ODORS THAT ARE THROUGHOUT THE MASS OF BUTTER

Because of their high fat content, cream and butter readily absorb and hold foreign odors and flavors. Such flavors may be present in butter to a slight degree or to a definite degree depending upon the character of the flavors and odors and the extent to which they have been absorbed.

A "musty" flavor may be absorbed by cream held in a damp cellar or cave. This flavor is usually carried into the butter when it is present in the cream. When present to a slight degree a musty flavor limits the flavor rating to a maximum of 90. This flavor, when associated with aged or old cream, limits the flavor rating to a maximum of 88.

"Woody" flavors may be caused by the cream or butter absorbing a woody flavor from a new churn that has not been properly treated. These flavors are limited to a maximum of 91.

FLAVORS OF OBSCURE ORIGIN

Flavors of an obscure origin are so classed because it is impossible to state definitely their source.

A "heated cream" (summer defect) flavor is usually caused by exposing the cream to the hot sun, but may be caused by artificial heat. When present to a slight degree, it limits the flavor rating to a maximum of 92.

A "flat" flavor in butter may be caused by mechanical operations, or it may be the result of the composition of the milk, or by feeds that do not have an aromatic flavor. Such butter lacks definite flavor and is low in volatile acidity. When present to a slight degree, it limits the flavor rating to a maximum of 92.

A "coarse" flavor in butter may be expressed negatively as a lack of delicate flavor or aroma. It may be caused by salt or acid. A slight coarse flavor limits the flavor rating to a maximum of 92.

"Smothered" flavors are usually caused by improper cooling of the cream or lack of aeration of it. A definitely smothered flavor limits the flavor rating to a maximum of 91.

A "bitter" flavor is one that produces a puckery sensation. It may be caused by the action of micro-organisms through the production of the enzyme lipase, by this enzyme secreted in the milk at the time of milking, and by the churning of cream that has been frozen and not properly thawed out. When slight, this flavor limits the flavor rating to a maximum of 91.

An "old-cream" flavor in butter is usually caused by aged cream. It may also be caused by cans and utensils that have been improperly washed. An old-cream flavor, when present in butter to a slight degree, limits the flavor rating to a maximum of 91.

"Stale-cream" flavor in butter is commonly caused by aged cream of poor quality. It may also be caused by faulty sanitation. When present to a slight degree, it limits the flavor rating to a maximum of 89.

"Barny" flavors, although commonly attributed to the absorption of cow-stable odors, may also be caused by certain bacteria or micro-organisms. When present to a slight degree, barny flavor limits the flavor rating to a maximum of 90. This flavor, when associated with aged or old cream, limits the flavor rating to a maximum of 88.

CONDITIONS AND FLAVORS PRESENT ON SURFACE OF BUTTER

The presence of mold on the surface or in the butter is a serious condition. It occurs most commonly during the spring and early summer and appears as yellow, red, brown, green, or black spots which may spread and which may penetrate through the liner and into the butter. It is a fungus growth that develops rapidly in a warm, humid atmosphere. The curd in butter furnishes an excellent medium for its growth. Because salt retards mold growth, mold development is more rapid in unsalted than in salted butter. Mold on the surface of butter may be scraped off together with a thin layer of the butter, but it is not always possible to ascertain the exact depth to which the mold has penetrated and unless enough butter is removed to take off every particle of mold it will develop again if conditions are favorable for its growth. The commercial value of butter, when mold is on the surface of it, is reduced by the cost of labor and the loss in weight of the butter incurred by the removal of the mold and the relining of the packages. When

mold is present only on the surface and to a very slight extent, the nature and extent of the development of the mold should be stated on the grading certificate. When mold has developed over the surface to any considerable extent or on the packing materials that contact the butter or has penetrated the butter to any appreciable extent so that it cannot be removed by scraping a thin layer of the butter, such butter should be classified as "no grade." When there is any development of mold on the surface of print butter or on the packing materials that come in contact with the butter, such butter should be classified as "no grade."

Certain flavors that are present on the surface of butter are caused by absorption, or are due to the age of the butter, or to the care that has been given it. The flavors that are most frequently encountered are fruity, storage, woody, tallowy, rancid, paint, varnish, chemical, gasoline, kerosene, fly spray, and disinfectant.

Butter held in a room in which apples, strawberries, or other fruits are stored is likely to absorb a "fruity" surface flavor, the extent of which would depend upon the character of the fruit, temperature of the room, and the length of time the butter was kept in the room.

Butter held in cold storage for a period of time, approximately 3 or 4 months, may develop a "storage" surface flavor.

Butter packed in unparaffined tubs or cubes may develop a "woody" flavor on tops, sides, and bottom. The age of the butter will have some effect upon the rapidity and extent of the development of this flavor.

Butter may possess a "tallowy" or a "rancid" flavor on the surface only, such condition being caused by chemical changes. Exposure of the butter to the direct rays of the sun will produce an oxidized flavor.

Butter shipped in a newly painted freight car that has paint odors in it may absorb a "paint" flavor on the surface. Butter may acquire a paint or varnish flavor on the surface when it is held in a creamery that has been freshly painted, especially if the butter is held without adequate refrigeration. In the case of print butter, a stale varnish flavor from the ink on the wrappers, particularly when the wrappers are heavily printed, may impart a varnish flavor to the surface of the butter.

Butter may possess a "chemical" flavor on the surface if the butter is exposed to pungent chemical odors.

Butter will absorb gasoline, kerosene, fly spray, and disinfectant odors when exposed to the air containing odoriferous substances from these products.

When any of these surface flavors are present, the surface of the butter should be scraped and the intensity of the flavor noted. Scrapings should be taken from just under the surface to ascertain the depth of penetration of the flavor. The interior of the butter should be examined in the usual way. When any of these surface flavors are present only on the surface and may have penetrated to a depth of not more than one-fourth inch in bulk butter or one-sixteenth inch in print butter, such butter shall be rated for flavor solely on the basis of the flavor of the interior portion of the butter. However, the character, degree, and extent of the flavor on the surface of the butter should be fully described on the grading certificate and the United States score of the butter followed by the words, "off surface condition." When fruity, storage, and woody flavors have penetrated or are present in bulk butter beyond a depth of one-quarter inch, or in print butter beyond a depth of one-sixteenth inch, the butter shall be rated for flavor on the basis of such flavors being present throughout the mass of butter. When these flavors (except fruity, storage, and woody) have penetrated the surface in bulk butter beyond a depth of more than one-quarter inch and in print butter to a depth greater than one-sixteenth inch, such butter shall be classified as "no grade."

OTHER FLAVORS AND CONDITIONS IN BUTTER THAT CAUSE IT TO BE CLASSIFIED AS "NO GRADE"

Butter that shows certain serious flavor defects or conditions, or that is below the requirements for United States 85 score, is classified as "no grade." The following flavors when present throughout the entire mass of butter cause it to be classified as "no grade": Pronouncedly fishy, surface-taint, Limburger, tallowy, rancid, chemical, gasoline, kerosene, fly spray, and disinfectant.

A flavor known as "surface taint" is indicative of protein decomposition. This flavor is usually limited to the surface. "Surface taint" is generally caused by contamination of the pieces of equipment with which cream and butter come in contact during the process of manufacture.

A flavor that resembles the taste and smell of Limburger cheese, and occurs most frequently in unsalted

or very lightly salted butter of low acidity, is termed "Limburger." Limburger flavors may extend through the entire mass. The organisms that cause this undesirable flavor are of the protein-decomposing type. Limburger flavor may be caused by the use of contaminated or polluted wash water, the addition of unpasteurized cream to pasteurized cream, contaminating material from cracks and crevices in vat covers and stuffing boxes, unpasteurized cream in the outlet pipe, contaminated butter scraps added to the churn, or unsterile cream pumps, pipe lines, churns, and pieces of equipment that come in contact with the butter during the packing and cutting operations.

"Tallowy" flavor in butter is an odor and taste like tallow. It is usually caused by oxidation of the fats along with the catalytic effect of metals. It develops most frequently in butter that is distinctly alkaline. Where oxidation or catalytic action has taken place a bleached condition may be present below the surface, turning the butter white.

Rancidity in butter is indicated by a decomposed and volatile condition of the fat, producing a very disagreeable flavor and odor that is often described as "strong." Rancid flavor may be caused by a splitting of the fats by enzymes that result from micro-organic action.

"Paint" or "varnish" flavors in butter result from absorption or from addition of these foreign materials to milk or cream.

"Chemical" flavors in butter are acquired as the result of absorption or addition of such materials to the milk or cream, or the unfinished butter in the churn.

"Gasoline," "kerosene," "fly spray," and "disinfectant" flavors in butter result from the absorption or addition of these foreign materials to the milk, cream, or unfinished butter in the churn.

The following conditions cause butter to be classified as "no grade": Grains of sand, splinters of wood, and specks of rust.

Butter that possesses grains of sand is very objectionable. The sand renders it unsalable except for refining or renovating purposes. For the most part this condition is caused by grains of sand in the wash water which are incorporated in the butter. The sand may be detected by melting the butter on the tongue and by forcing it between the teeth. The sand will not go into solution.

Splinters of wood in butter are usually caused by a break in some of the inner mechanisms of the churn,

such as the rollers and shelves. They may also result from old churn drums that are severely splintered from heating the wash water with live steam through a hose or pipe. Occasionally wooden particles are carried into the butter with the salt as the result of carelessness in opening the salt barrels, or by torn salt-barrel liners.

Specks of rust in butter are usually caused by rust forming on bolt heads or other metal parts inside the churn drum. Other possible sources are from water pipes, tanks, or wells, especially if the wash water is not strained through a cotton disk.

FACTOR OF BODY IN BUTTER

In grading butter, the factor of body is considered from the standpoint of its defects. Defects in body are rated according to their degree. The butterfat in milk is a mixture of various fats which are not always present in the same proportions. In spring, during the fresh-grass season, the percentage of soft or low-melting-point fats is larger and the churning temperature must be lowered if butter is to be in a firm condition. The butterfat in cream is present in the form of minute globules. During the churning process, the fat globules gather into clumps and form granules. When the cream is churned cold enough so that the fat is kept firm, and then the butter is worked sufficiently, the water will be present in the form of minute droplets throughout the mass of fat.

The character of the body is dependent largely upon the character of the granules and their closeness or compactness as the result of working. The character of the granules is influenced by the physical properties of the butterfat, the rate of cooling, and the temperature to which the cream is cooled and held, the churning temperature, the temperature of the wash water used, and the size and condition of the granules when the washing of the butter is stopped.

The "texture" of the butter is dependent upon the size of the granules and the manner and amount of working of the butter, as well as on the physical properties of the butterfat.

In butter that has a perfect "body," the granules are closely united and when the butter is broken apart, it shows a firm, waxy, close-grained structure. From such butter a trier sample that is full and smooth can be drawn if the temperature conditions are right, and if a clean, smooth trier is used.

The most common defects in body are termed mealy, gummy, leaky, leaky-sticky, leaky-briny, leaky-cloudy, leaky-briny-cloudy, sticky and pasty, salvy, greasy, spongy or weak, crumbly, and ragged-boring.

Mealiness in butter refers to a granular consistency that is noticeable when butter of that character is melted on the tongue. Mealiness may be caused by a granular condition of the fat resulting from frozen cream, from melting and recrystallization of lumps of butter put into the cream vat before pasteurization, or by the pasteurization of the cream that is acidy and in which a slight curdling takes place. It may also be caused by too high a temperature at the time of neutralization and by improper neutralization. Slow cooling of cream after pasteurization may also cause mealiness in butter.

"Gummy" butter, when placed in the mouth, does not melt readily because of the excessively hard fats present. Feeding cottonseed meal or whole cottonseed in quantities sufficient to supply the bulk of the protein in a ration will produce a high proportion of high-melting fats and a hard-bodied butter. This condition becomes more intensified when cottonseed meal or hulls are fed with dry roughage. Succulent feeds and green pastures partly offset the effect of cottonseed meal and cottonseed hulls on the character of the fat.

A "leaky" body is indicated by drops of water that drain from the butter and appear as beads of moisture on its surface and the back of the trier. It is caused by incorporation of the water loosely in pockets between the granules. Despite the fact that leaky butter shows an apparent excess of free water, it may actually contain less moisture than properly worked butter of a higher moisture content in which the moisture is incorporated in a fine film over the granules and as finely divided droplets surrounded by fat.

A "leaky-sticky" body is indicated when the butter adheres to the back of the trier and shows large droplets of water. This condition is caused by not holding the cream at low enough temperatures or long enough before churning. It may also be caused by too great a spread between the churning temperature and the temperature of the wash water.

A "leaky-briny" condition is indicated by a briny-watery appearance on the surface of the butter and on the back of the trier. This condition is usually caused by adding dry salt to the butter coupled with insufficient

working. It may also be caused by excessive salting of the butter.

A "leaky-cloudy" condition is indicated by a milk-cloudy appearance on the surface of the butter and on the back of the trier. This condition is caused by improper washing, lack of proper working of the granules, and insufficient draining of the buttermilk. Too high a temperature may also be a causative factor in producing a "leaky-cloudy" body.

A "leaky-briny-cloudy" condition is indicated by a briny, cloudy appearance of the moisture on the surface of the butter and on the back of the trier. This condition is caused by lack of proper washing of the granules and draining of the buttermilk, or may be due to excessive salting or dry salting of the butter.

When a "sticky" or "pasty" body is present, the butter adheres to the trier as a smear and when the trier sample is replaced the trier becomes smeary throughout its length. This body defect is often associated with a crumbly condition and occurs most frequently in winter butter. The temperature to which cream is cooled and held, rate of cooling, length of time cream is held before churning, temperature of wash water, and churning temperature are factors that are responsible, alone or in combination, for sticky butter. These conditions should be adjusted according to seasons of the year and under different feed conditions.

A "ragged-boring" body in contrast to solid-boring is a sticky-crumbly condition that is present when a full trier cannot be drawn. It is most prevalent in winter when the percentage of hard fats is highest. Butter that "rolls" from the trier is described as ragged-boring. This condition is influenced by rate of cooling of the cream after pasteurization, the temperature at which the cream is held, length of time the cream is held before churning, temperature of the wash water, or the churning temperature. Butter with a well-made close granular body may roll or "ball up" on the trier when sampled in a cold place or with a cold trier.

When a "salvy" condition of the body is present the butter adheres to the back of the trier as a "smear." In salvy butter the granular structure has been destroyed. It is generally the result of overworking and may be associated with improper churning temperatures.

When a "greasy" condition of the body is present, the butter adheres to the back of the trier as a slight greasy film. In greasy-bodied butter, the granular structure

has been destroyed. The temperatures to which the cream is cooled after pasteurization, time required in cooling, the length of time the cream is held before churning and the temperature at which the cream is churned, are factors that contribute to a "greasy" body.

A "spongy" or "weak" body lacks compactness or firmness. This condition is generally due to a failure to cool the cream rapidly and to hold it at a proper temperature. The composition of butterfat varies considerably, especially when the cows are turned from winter feed to fresh green grass. On certain dry feeds, cows produce a higher percentage of hard fats and on fresh new grass they produce a higher percentage of soft fats. When butter fat containing a higher percentage of soft fats is churned the cream should be cooled rapidly and to a lower temperature and it should be churned at a lower temperature.

A "crumbly" body in butter occurs most frequently during the winter and is generally associated with a sticky condition. This condition is probably related to the composition of the butterfat. The temperature to which the cream is cooled, rate of cooling, length of time cream is held before churning, churning temperature, and temperature of the wash water are important points to be considered. Sudden chilling of butter to low temperatures immediately after churning in the winter may also cause crumbly-bodied butter.

FACTOR OF COLOR IN BUTTER

The color of butter is considered defective when it lacks uniformity or is higher than the natural color of butter when cows are on full-grass pasture. The higher the flavor rating of butter, the more serious or objectionable is a color defect. The natural color of butter varies according to seasonal and sectional conditions, but may be kept within certain limits by the proper use of butter color. Defects in color are rated according to their degree. A range in the natural color of butter is permitted without the color being rated as defective. However, when the color is uniform and is higher than a natural full-grass color a rating of at least 1 for defect in color is made. A very light cream color is not considered a defect.

"Wavy" color in butter is an unevenness in the color that appears as waves of different shades of yellow color. Wavy color is caused chiefly by an uneven dis-

tribution of the water and salt in the butter. It may result from overloading the churn during the working process or from rollers that are improperly set or defective, thus causing an uneven working of the entire mass of butter in the churn. Using salt of a much lower temperature than the butterfat granules may also cause an uneven color. Adding wash water that is too cold to granules may also cause wavy butter, as it gives a firmer condition to the outside of the granule than the interior has from the original temperature.

"Specks" appear in butter as small white or yellow spots. White specks are small particles of curd, about the size of a pinhead, and may be due to faulty neutralization. When low-test cream is held at a comparatively high temperature, the skim milk has a tendency to settle and coagulate, forming curd that breaks up during churning into fine, hard, white particles that appear in the butter. Yellow specks or blotches may appear in the butter as spots of variable size. They may be caused by sediment in the color or by granules which, lodging between the shelves and churn drum, are not well worked into the mass of butter.

"Mottles" appear as light-colored areas in the butter surrounded by more highly colored portions. They are caused by an uneven distribution of the salt, a lack of sufficient working, or adding too cold wash water to the granules. Mottles give the butter a marbled appearance.

"Streaked" color appears as long streaks of light-colored portions surrounded by more highly colored portions. Streaks are mainly caused by improper working or working that is insufficient to insure a thorough dissolving of the salt and a uniform incorporation of the moisture. They are also caused by adding to the butter in the churn at the time of working portions of previous churnings that are of a different color.

FACTOR OF SALT IN BUTTER

The factor of salt in grading butter is considered from the standpoint of the degree of salt taste and whether it is completely dissolved. A certain range in the salt content or salt taste of butter is permitted without considering it a defect. This range provides for the various market preferences for salt content in butter. A light or medium salt content of butter is considered free of defect if the salt is completely dissolved. Fine-quality butter has a mild or delicate flavor when it is lightly

salted. When it is salted too heavily, the fine flavor is made obscure by a sharp salty taste. When a pronounced sharp salty taste is present, it is rated 2 for defect in salt.

Unsalted butter is not rated for defects in salt but is described on the grading certificate as "Unsalted."

The principal defects in salt are a sharp salty and gritty condition. A sharp salty condition usually indicates an excessive salt content particularly when the butter is free from a leaky condition.

A gritty salt condition results from undissolved grains of salt in the butter. It is readily detected by the gritty feel of the grains of salt that are present. Grittiness is due to too much salt, insufficient working, or insufficient moisture in the butter.

RATING OF DEFECTS IN BODY, COLOR, AND SALT

The defects in body, color, and salt are rated independently and entirely upon their extent or degree. A classification of the ratings for the various degrees of defects in body, color, and salt is given in table 2 (p. 29).

The terms "slight," "definite," "pronounced," and "extreme" are used to designate four degrees of defect. Numerical ratings of ½, 1, and 2 are given the first three degrees, respectively, for all body defects, with the exception of leaky-sticky, leaky-briny, leaky-cloudy, leaky-briny-cloudy, and ragged-boring which are covered by special rules. In butter that has a "leaky-sticky," "leaky-briny," "leaky-cloudy," and "leaky-briny-cloudy" condition a slight defect is rated 1, a definite defect 2, and a pronounced defect 3. Defects in a "ragged-boring" body are classified as definite, pronounced, and extreme. A definitely "ragged-boring" body is given a rating of 3. When more intense, so as to be classified as pronounced, it is rated 4 and when present to a greater degree, the defect is described as extreme, and it is rated 5.

All color defects with the exception of high color, mottles, and streaks are classified as slight, definite, and pronounced. A slight defect is given a rating of ½. Defects classified as definite are rated 1 and when they are pronounced they are rated 2. High color is classified as definite, pronounced, and extreme. High color when classified as definite is given a rating of 1; when pronounced, 2; and when extreme, a rating of 3 is given. Mottles or streaks are classified as slight, definite, pronounced, and extreme. Mottles or streaks, when

classified as slight, are rated 2; when definite, 3; when pronounced, 4; and when classified as extreme, a rating of 5 is given.

Two defects are recognized in the factor of salt; namely, sharp and gritty. When a slight sharp salty condition is present a rating of ½ is given; when the degree is definite a rating of 1 is given; and when it is pronounced, a rating of 2 is given. A gritty condition is a more serious defect and therefore has a wider range of ratings. When this defect is slight, a rating of 1 is given; when definite, a rating of 2; when pronounced, a rating of 3, and when the degree of defect is extreme, a rating of 4 is given.

TABLE 2.—*Classification of rating of defects in body, color, and salt*

(Key of symbols: S—slight; D—definite; P—pronounced; E—extreme)

Defects	Rating to be given for degree of each defect					
	½	1	2	3	4	5
Body:						
Mealy	S	D	P	------	------	------
Gummy	S	D	P	------	------	------
Leaky	S	D	P	------	------	------
Leaky-sticky	------	S	D	P	------	------
Leaky-briny	------	S	D	P	------	------
Leaky-cloudy	------	S	D	P	------	------
Leaky-briny-cloudy	------	S	D	P	------	------
Salvy	S	D	P	------	------	------
Greasy	S	D	P	------	------	------
Spongy or weak	S	D	P	------	------	------
Crumbly	S	D	P	------	------	------
Sticky or pasty	S	D	P	------	------	------
Ragged-boring	------	------	------	D	P	E
Color:						
Wavy	S	D	P	------	------	------
Specks or blotches	S	D	P	------	------	------
High color	------	D	P	E		
Mottled	------	------	S	D	P	E
Streaked	------	------	S	D	P	E
Salt:						
Sharp	S	D	P	------	------	------
Gritty	------	S	D	P	E	------

TOLERANCES FOR DEFECTS IN BODY, COLOR, AND SALT PERMITTED IN BUTTER OF CERTAIN FLAVOR RATINGS

In the distribution of butter in commercial channels of trade, defects in body, color, and salt are less important in butter that is below U. S. 90 score than in butter above that grade. Accordingly a tolerance for defects in body, color, and salt is permitted in butter of certain flavor ratings without lowering the score below the flavor rating.

In butter with a flavor rating of 93 to 90, a defect of one-half is permitted in any one factor without lowering the final score below the flavor rating.

In butter with a flavor rating of 89 or 88, a total tolerance of 1 is permitted, which may consist of one-half in any two factors or 1 in any one factor.

In butter with a flavor rating of 87, a total tolerance of 2 is permitted, which may consist of one-half in each of two factors and 1 in a third factor, or 1 in each of two factors or 2 in any one factor.

In butter with a flavor rating of 86, a total tolerance of 3 is permitted, which may consist of 1 in all three factors or 1 in one factor and 2 in one other factor, or 3 in any one factor.

In butter with a flavor rating of 85, the total tolerance for defects permitted is limited to 4, which may consist of 1 in two factors and 2 in a third factor, or 2 in any two factors; or 1 in one factor and 3 in another factor; or 4 in any one factor.

EXPLANATION OF APPLICATION OF THE GENERAL RULE AND TABLE 1 IN GRADING BUTTER

When the total ratings of the defects in the factors of body, color, and salt are in excess of those permitted in these factors for butter of a particular flavor rating, the official United States score is determined according to the general rule by deducting from the flavor rating of the sample the amount that the total ratings given the defects in the factors of body, color, and salt is in excess of the ratings for defects permitted in these factors (table 1, p. 10), the official United States score always being expressed as a whole number by lowering any half score to the next lower full score. The following examples illustrate the application of the general rule (p. 4) and of table 1 in the grading of creamery butter.

TABLE 3.—*Examples illustrating application of general rule*

Example No.	Flavor rating	Defects present in—			Total defects present	Defects permitted	Defects in excess of those permitted	Official United States score
		Body	Color	Salt				
1	93	½	0	0	½	½	0	93
2	93	½	1	0	1½	½	1	92
3	92	0	½	0	½	½	0	92
4	92	0	1	0	1	½	½	91
5	91	0	1	1	2	½	1½	89
6	90	1	0	0	1	½	½	89
7	89	½	½	0	1	1	0	89
8	89	1	1	0	2	1	1	88
9	88	0	2	1	3	1	2	86
10	87	2	1	0	3	2	1	86
11	87	2	2	0	4	2	2	85
12	86	1	3	0	4	3	1	85
13	85	2	2	1	5	4	1	(1)

[1] "No grade."

Examples 1, 3, and 7 are given an official United States score which is the same as the flavor rating because the defects in body, color, and salt are not in excess of those permitted in butter of the particular flavor rating. The official United States score of all other samples is lower than the flavor rating because the defects in body, color, and salt exceed those that are permitted in butter of the particular flavor rating, the excess being in the amount of one-half or more. In example 4, the flavor rating is 92. The defects permitted in body, color, and salt for butter of that flavor rating are limited to a maximum of one-half. The defects present in the sample amounted to 1, therefore the defects are in excess of those permitted by a total of one-half. The official United States score is lowered 1 below the flavor rating instead of one-half, because the official United States score must be expressed as a whole number. In example 9 the flavor rating is 88. The permitted defects in body, color, and salt for butter with a flavor rating of 88 are 1. The defects in this particular sample totaled 3 and are, therefore, in excess of those permitted by a total of 2. The official United States score, therefore, is 2 lower than 88, or 86. In example 13, the flavor rating is

85. The total permitted defects in body, color, and salt for butter with a flavor rating of 85 is 4. This butter showed defects totaling 5, or 1 in excess of those permitted in butter with a flavor rating of 85. The official United States grade of this butter is indicated by "no grade" because the application of the general rule would give this butter a score of 84. Such butter is below the requirements of U. S. 85 score because of excessive defects in body, color, and salt. Therefore, it must be classified as "no grade."

EXPLANATION OF UNITED STATES GRADES FOR CREAMERY BUTTER

The United States score grades are intended for use when churnings of the same score comprise a lot. No tolerance for lower score butter is allowed in a United States score grade.

A "mixed lot" of butter is one that is not uniform in quality and fails to meet the requirements of a particular United States score grade. The quality of a mixed lot is expressed by stating the range of the official United States scores of the individual samples graded in the lot as U. S. 89–91 score; U. S. 91–92 score; and U. S. 92–93 score.

Butter is classed as "no grade" whenever its quality or condition is below the requirements of U. S. 85 score.

CONTAINER, FINISH, AND APPEARANCE

The condition of the container in which butter is packed and the finish and the appearance of the butter may add to or detract from their attractiveness. The container is not a constituent part of the product, nor is the quality of butter dependent upon the type or style of the container. Under certain conditions, the price of a particular lot of butter may be influenced by the container and by the finish and appearance of the butter. When this is the case, the buyer and seller may well consider them in negotiating the price.

The type or style and the condition of the container and the finish and appearance of the packing should not be considered a factor in determining the score or grade of butter but should be described on the grading certificate.

DETAILED INFORMATION REQUIRED ON GRADER'S MEMORANDUM

The grader's memorandum should furnish detailed information regarding the ratings given the factor of flavor and the defects, if any, in the factors of body, color, and salt for each sample examined. It should also contain such other essential information as may be required in making out a grading certificate.

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